Pentagon Renovation Program Overview

Lee Evey
Program Manager
Pentagon Renovation Program

The Pentagon Building - A Small

34 acres

6.5 million sq. ft.

3 Empire State Bldgs.

7,748 windows

17.5 miles of corridors

25,000 personnel

1,000,000 calls each day

Police force

Metro station

Fire Station

Health Facilities

Post Office

Mini-mall

Heliport

The Pentagon: Original Construction

- Built on swampland
- Site of old Hoover airport
- Low residential area: “Hell’s Bottom”

The Pentagon: Original Construction

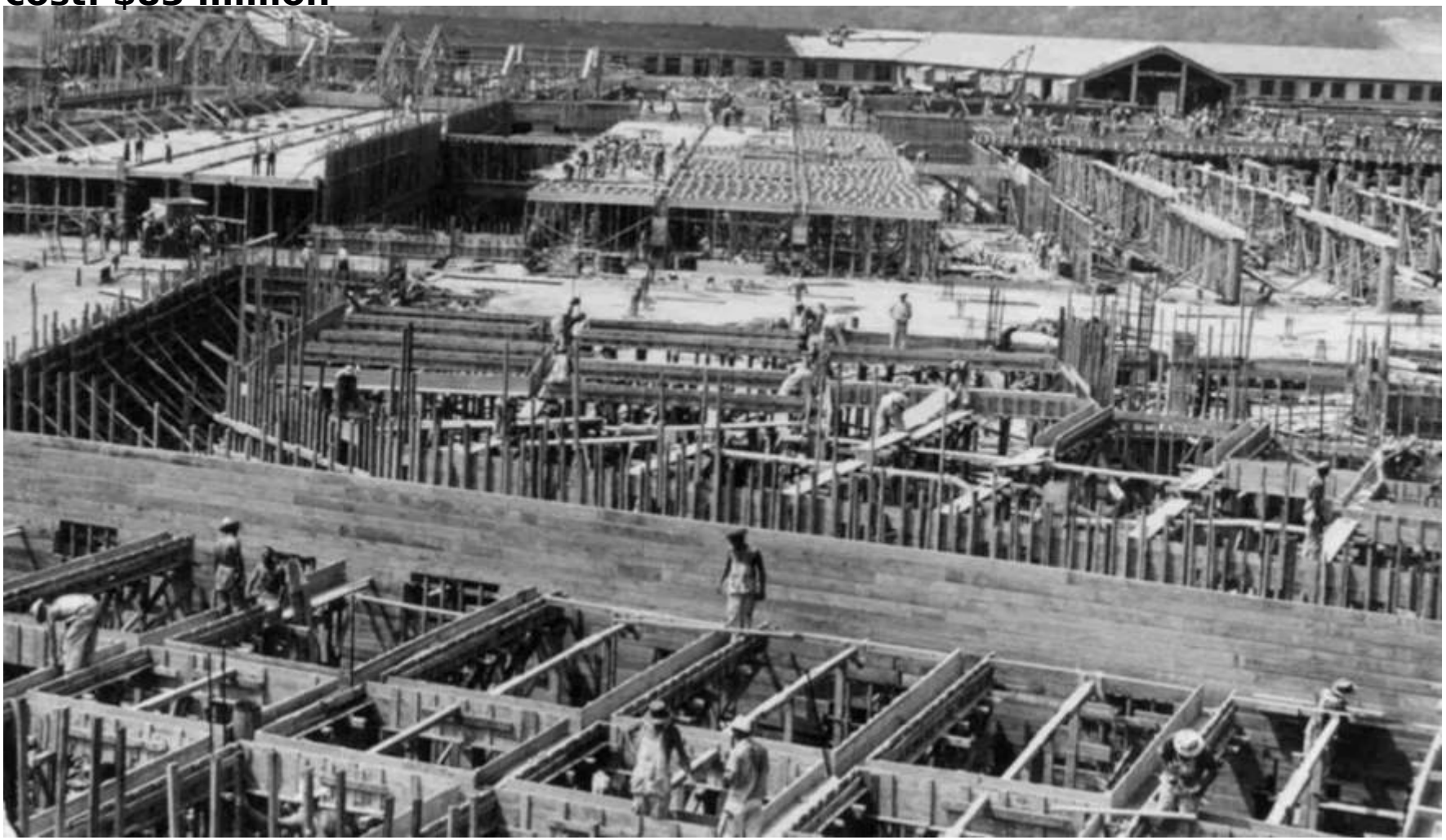
- 30 Miles of Roads, Bridges, Access Ramps - Minimal use of struct

The Pentagon: Original Construction

- 58 Years Old
- 16 Months Construction
- 435,000 CYs of Reinforced Concrete
- 42,000 Columns

The Pentagon: Original Construction

- 400 architects and engineers - 15,000 workers - Original cost: $83 million

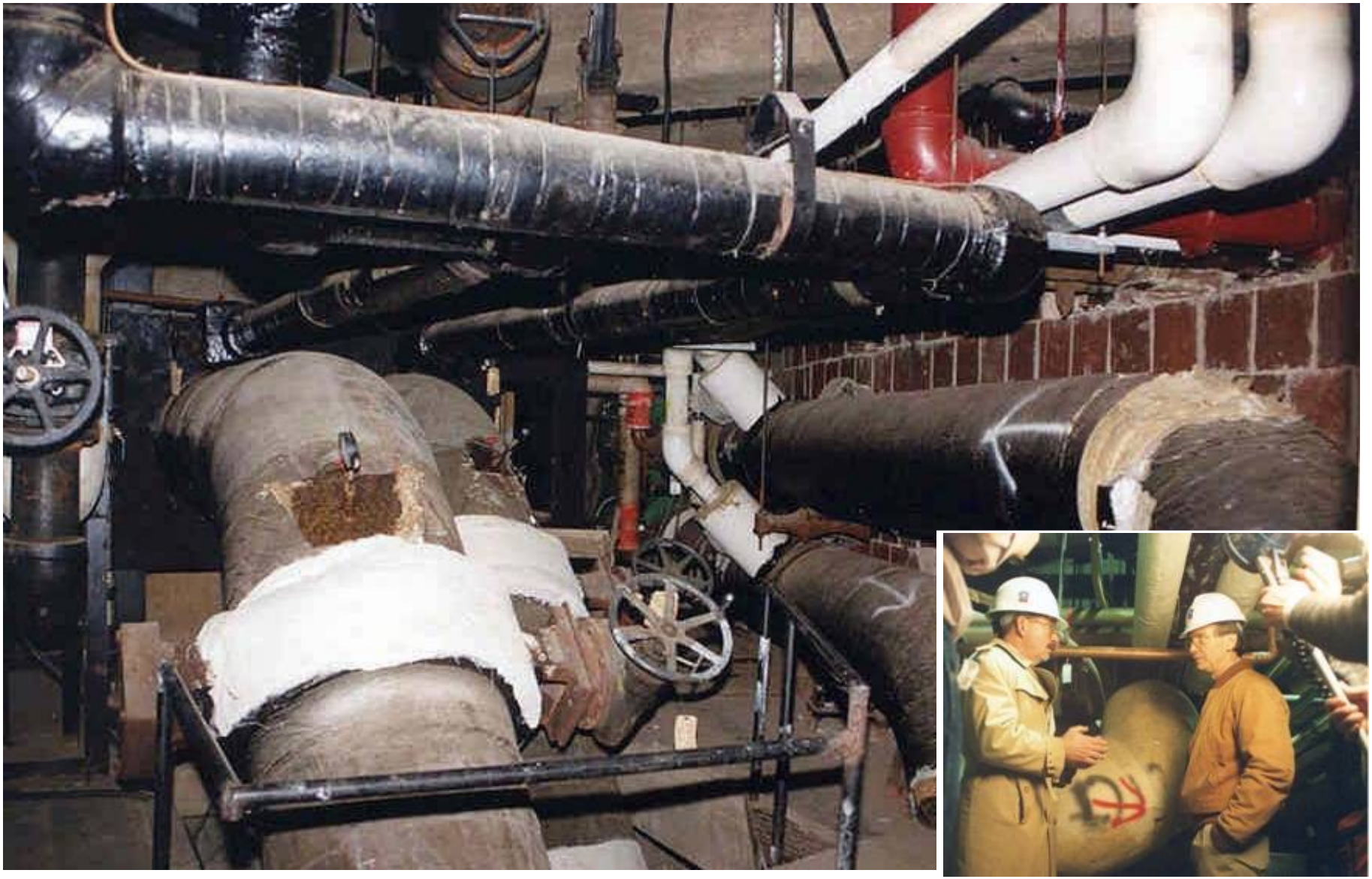


Pentagon Early Years:
"Open Bay" Office Environment

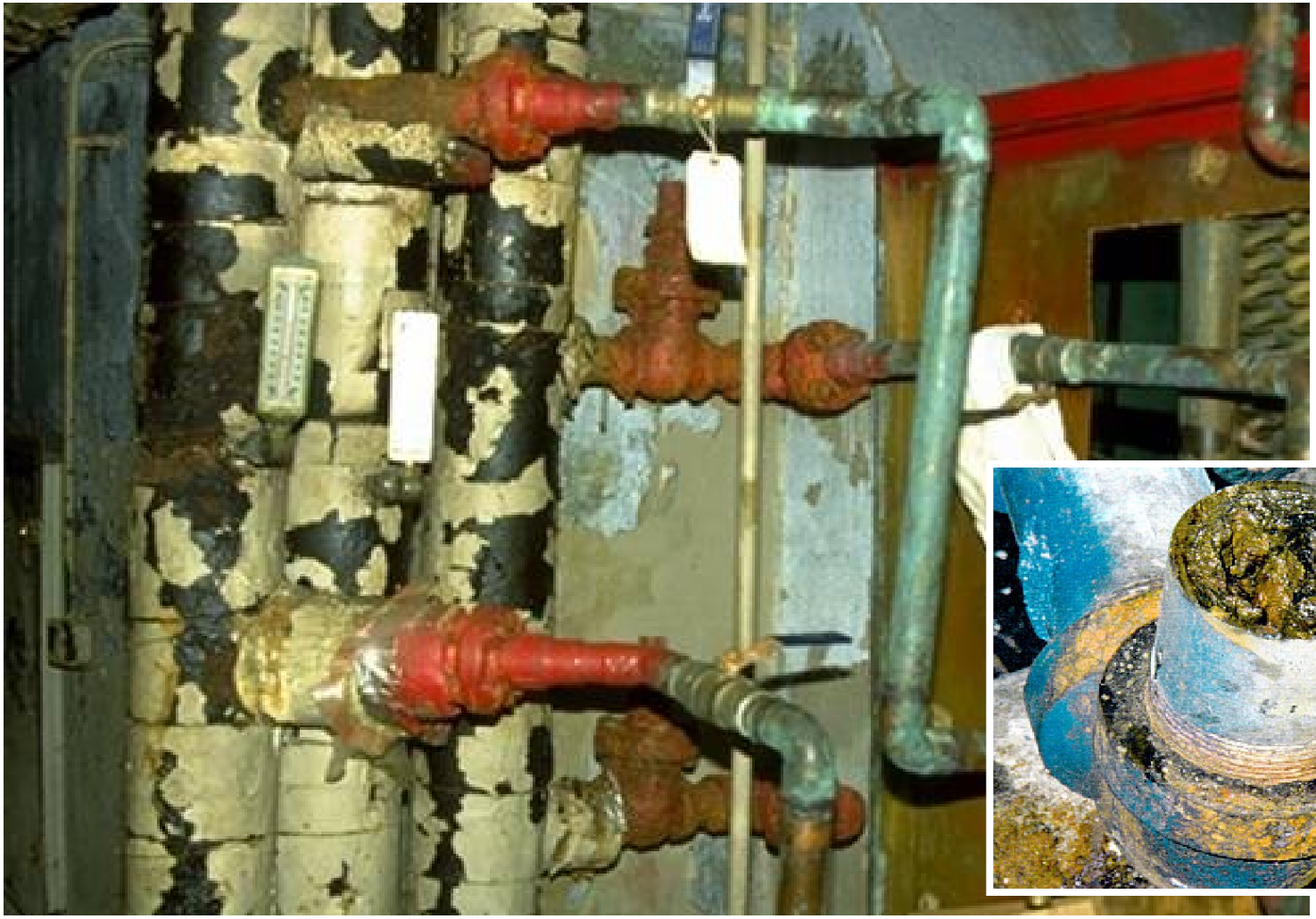
THE PROBLEM:

The Pentagon Has Never Undergone a Major Renovation in 58 Years

All Building Systems Need Replacement:
Utility Distribution System

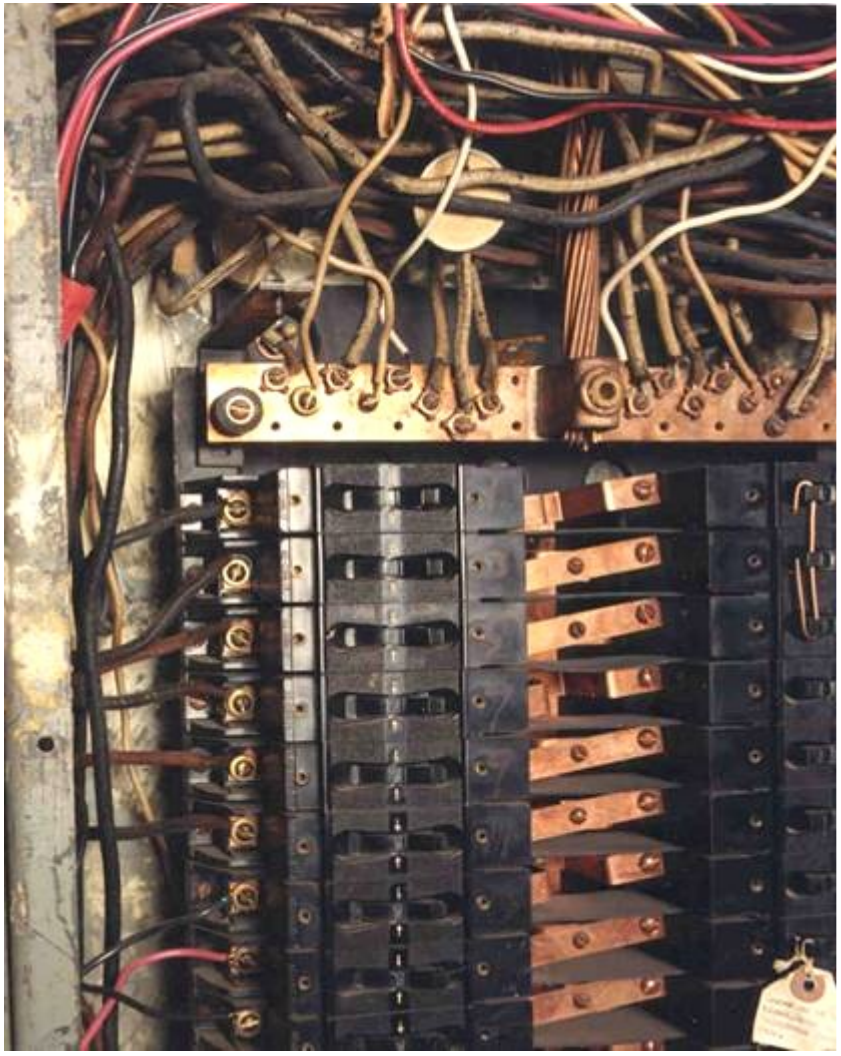


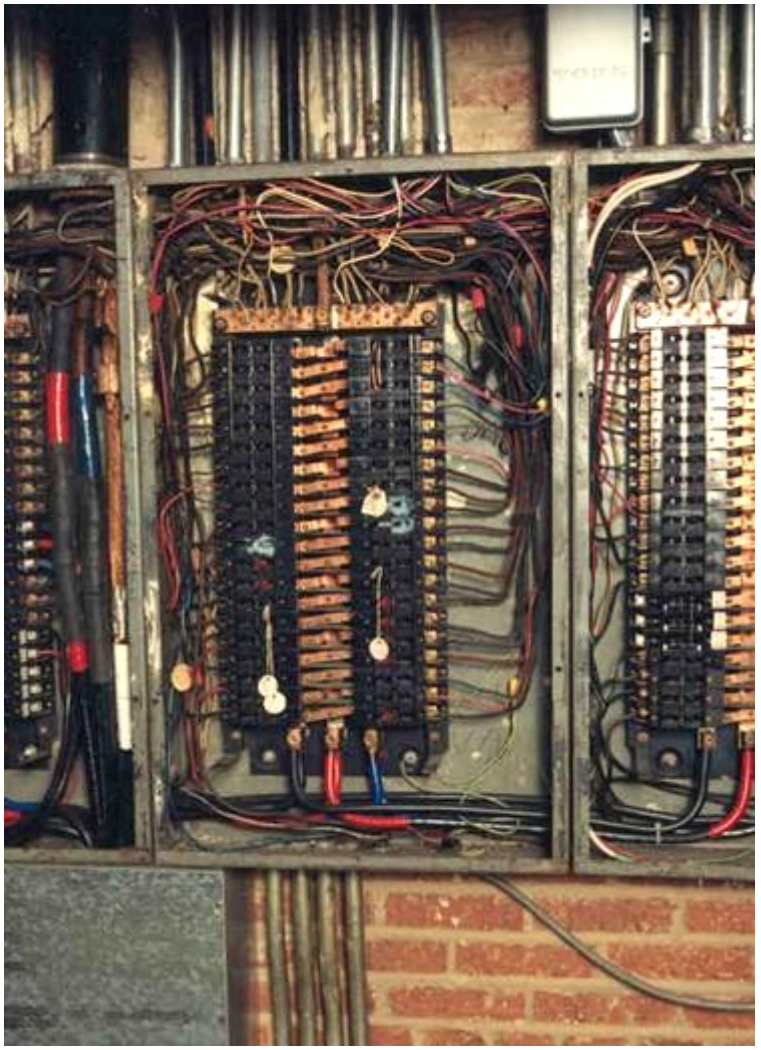
All Building Systems Need Replacement:
Plumbing



All Building Systems Need Replacement:
Ventilation

Building Code Violations:
Electrical, Fire, Life Safety, ADA and Others





Presence of Hazardous Materials

Asbestos, Lead Paint, Mercury, PCBs

Poor Thermal Envelope and Energy Efficiency

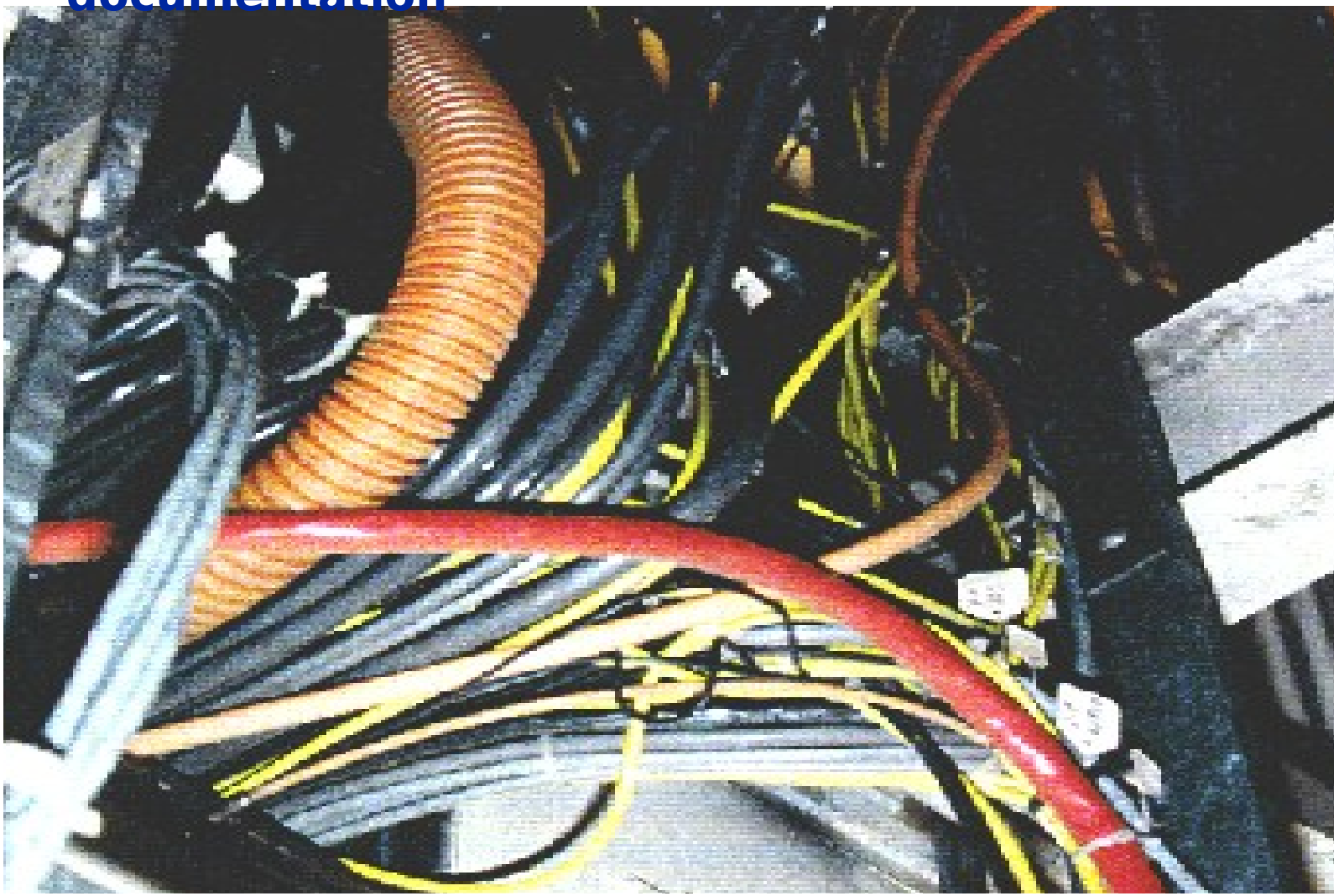
7,748 antiquated windows

30% energy loss

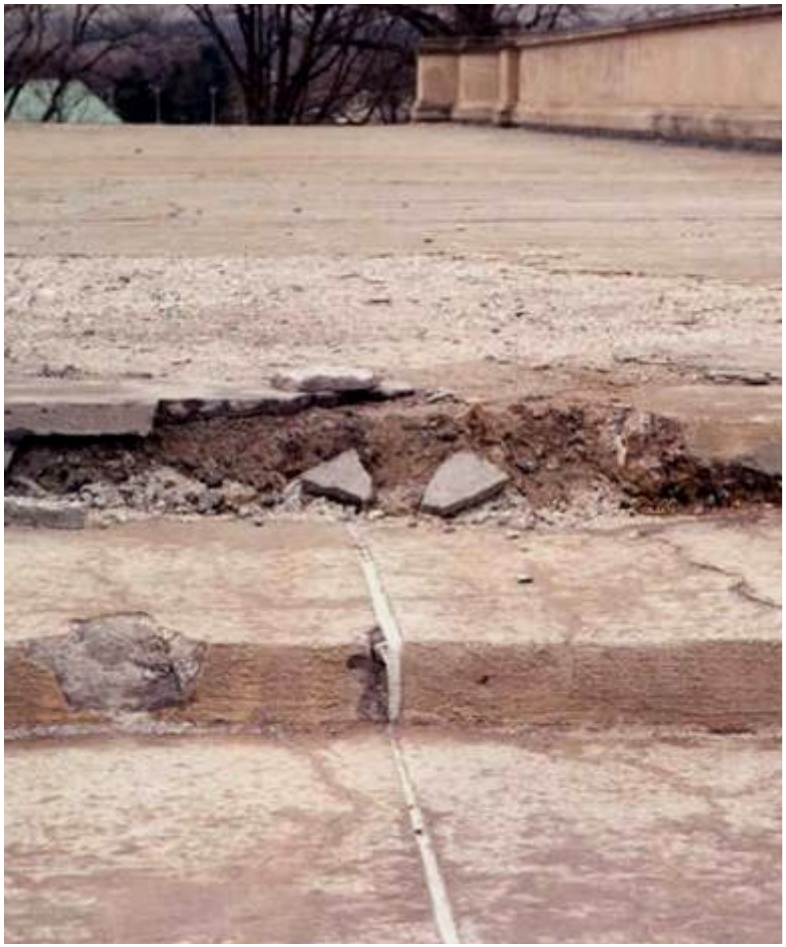
Antiquated Telecommunications System

Antiquated Telecommunications System (cont'd)

- Unidentified lines and conduits, poor documentation



Deteriorating Exteriors



Poor Working Conditions:

- Inefficient work space
- Minimal flexibility
- Outdated, mismatched furniture
- Unsafe

- Dark, dank corridors
- Poor air flow
- Shifting floor slab

ADA Violations

Poor Vertical Mobility

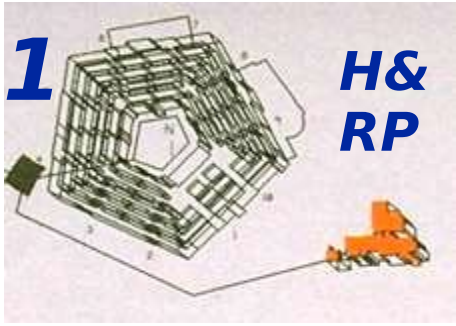
THE SOLUTION:

A COMPLETE RENOVATION

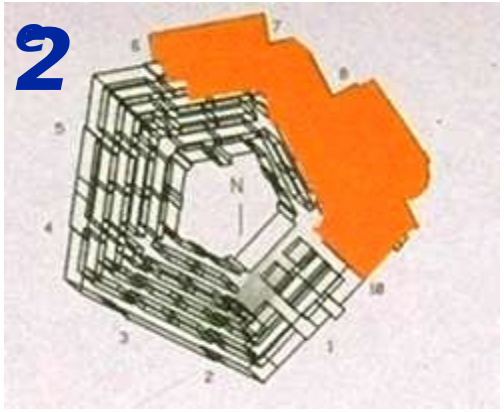
"Ceiling to Slab"

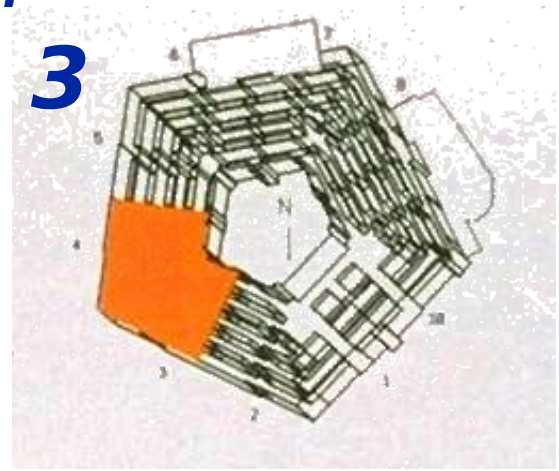
- ***Replace all building systems***
- ***Remove all hazardous materials***
- ***Improve energy efficiency***
- ***Bring building up to code compliance***
- ***Improve vertical mobility, comply with ADA***
- ***Enhance security***
- ***Improve pedestrian and vehicular traffic flow***
- ***Preserve/Restore Historical Features***

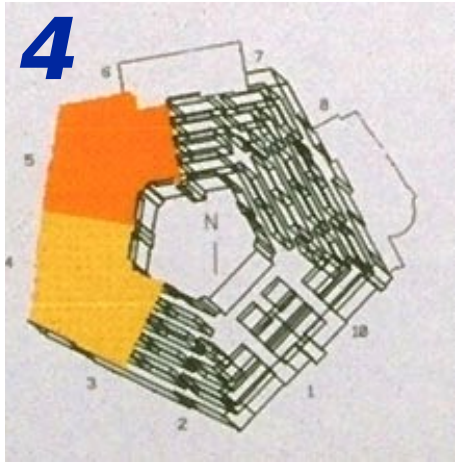
RENOVATION SEQUENCE

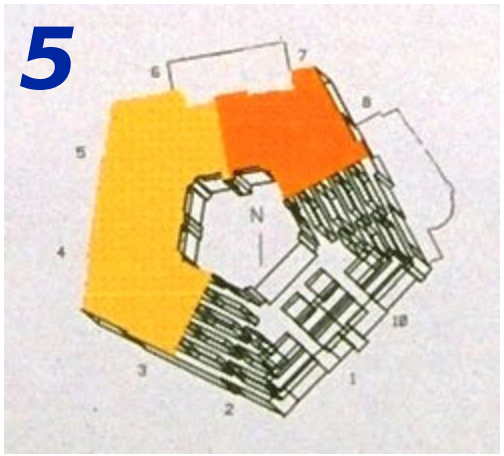


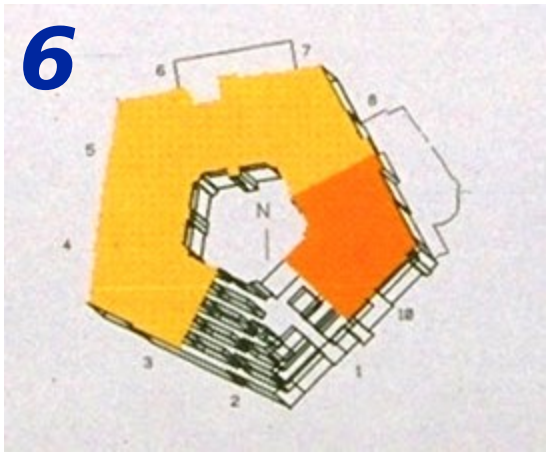
Basement/Mezzanin

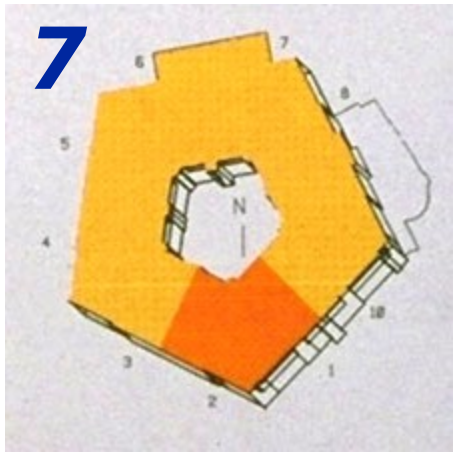




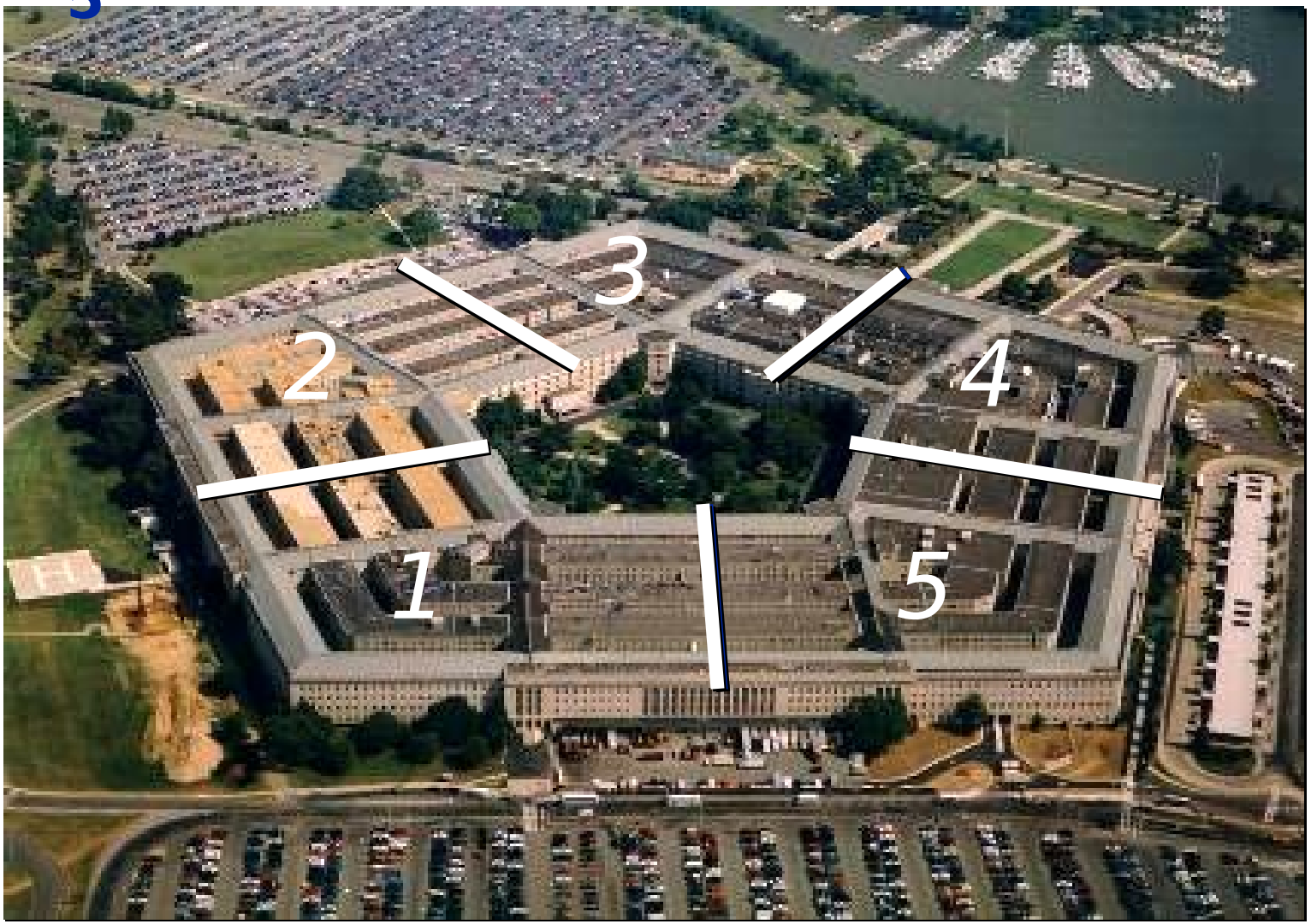








RENOVATION SEQUENCE: WEDGES 1-5



THE CHALLENGE:

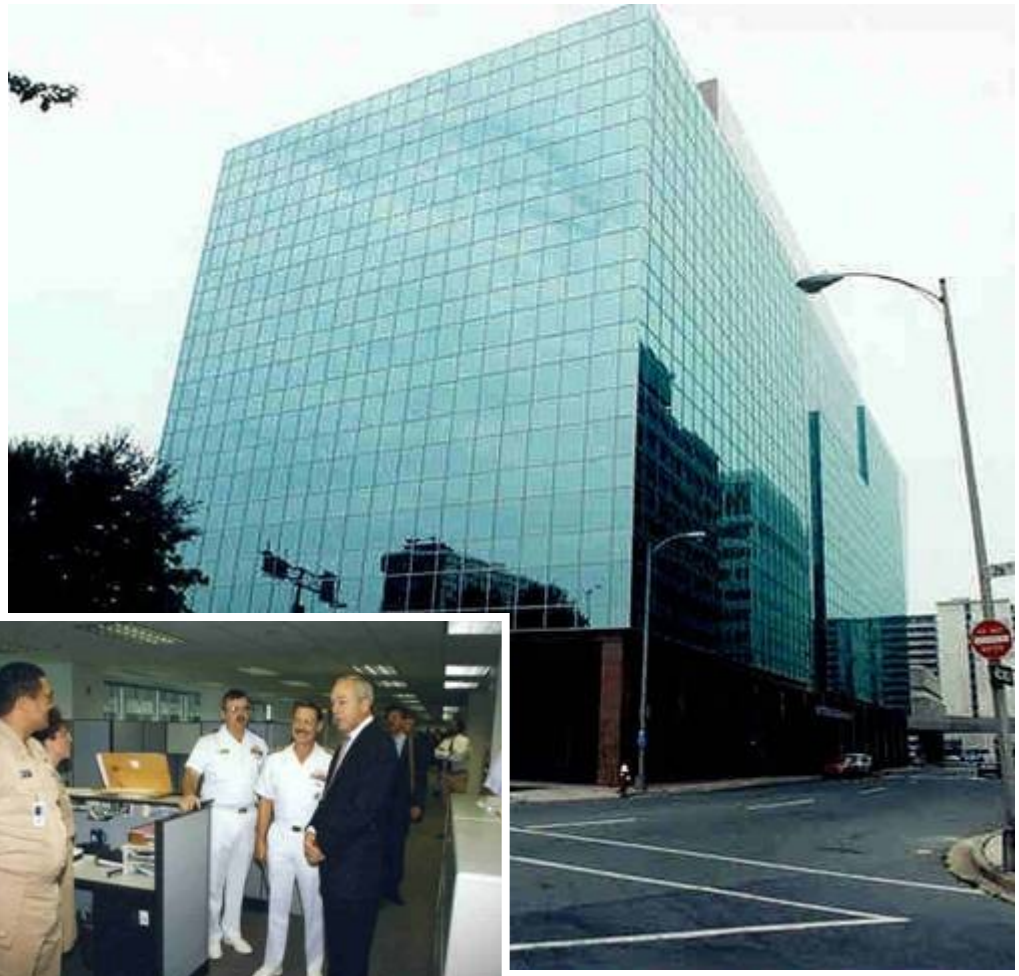
KEEP THE PENTAGON OPERATIONAL DURING RENOVATION

- ***Coordinate activities with all stakeholders***
- ***Relocate 25,000 people during course of renovation***
- ***Work around 20,000 people***
- ***Keep building systems operati***
- ***Minimize disruption***
- ***Maintain accessibility on all si***
- ***Maintain security***
- ***Maintain accessibility for pers with disabilities***

The Renovation Process

- *Coordination with Tenants - Requirements*
- *Preparation of Swing Space*
- *Move Tenants Out of Pentagon*
- *Construction of Barrier Walls*
- *Demolition and Abatement of Vacated Space*
- *Construction of New Space*
- *Commissioning*
- *Move Tenants Into Renovated Spa*

The Renovation Process: Swing Space



The Renovation Process: Preparation of Swing Space

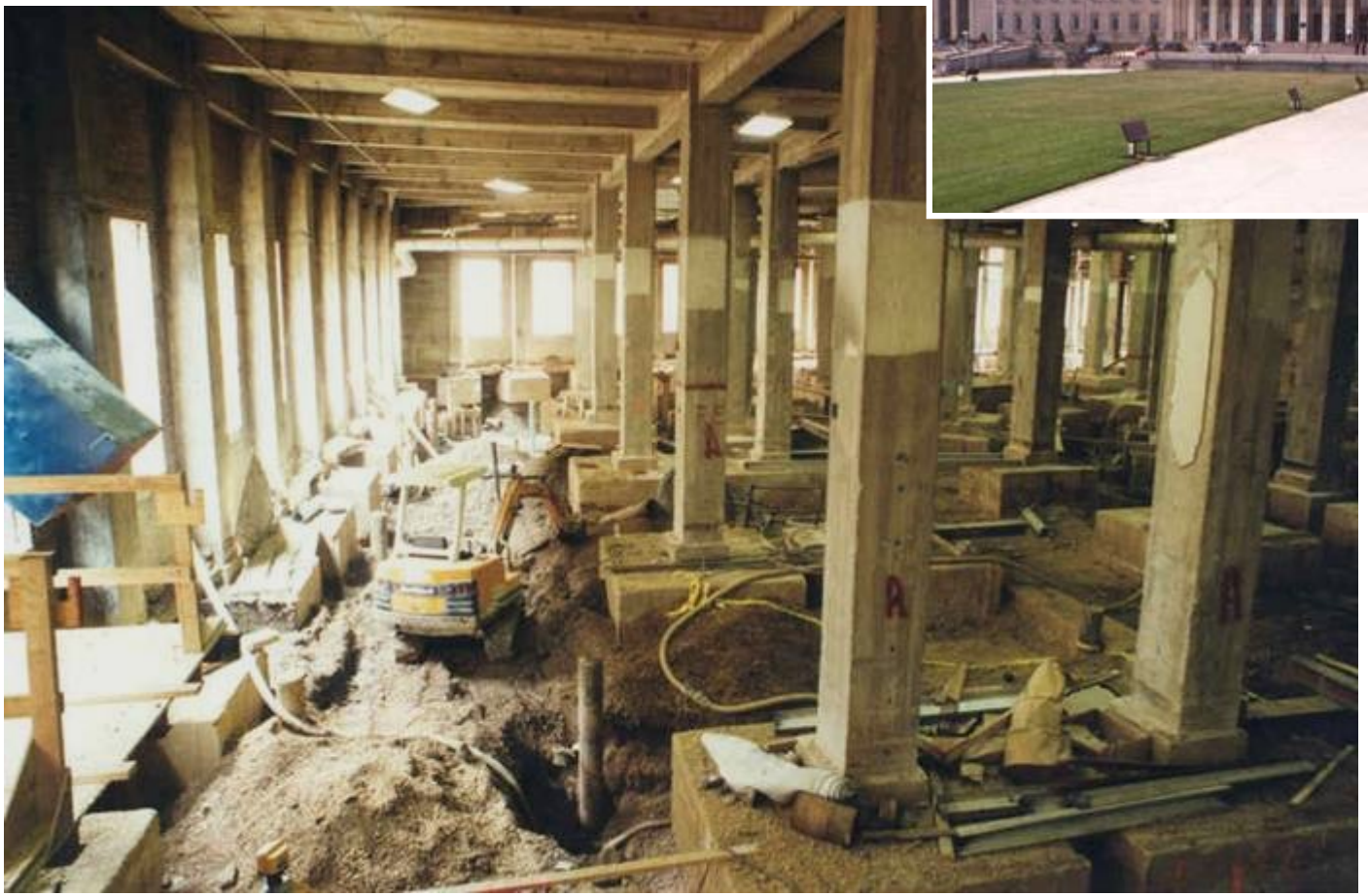
- *45 floors renovated*
- *Nearly 1,000,000 square feet*
- *5,500 tenants relocated*

- *Modern office environment*
- *Secure telecommunications*
- *Requirements duplicated*

The Renovation Process: Swing Space Renovation, Move-In

Renovation Begins in the Pentagon's Basement

The Pentagon Basement



Below River Terrace and Office of the Secretary of Defense

45,000 Cubic Yards Removed

The Pentagon Basement

Working at Night and on Weekends to Minimize Disturbances

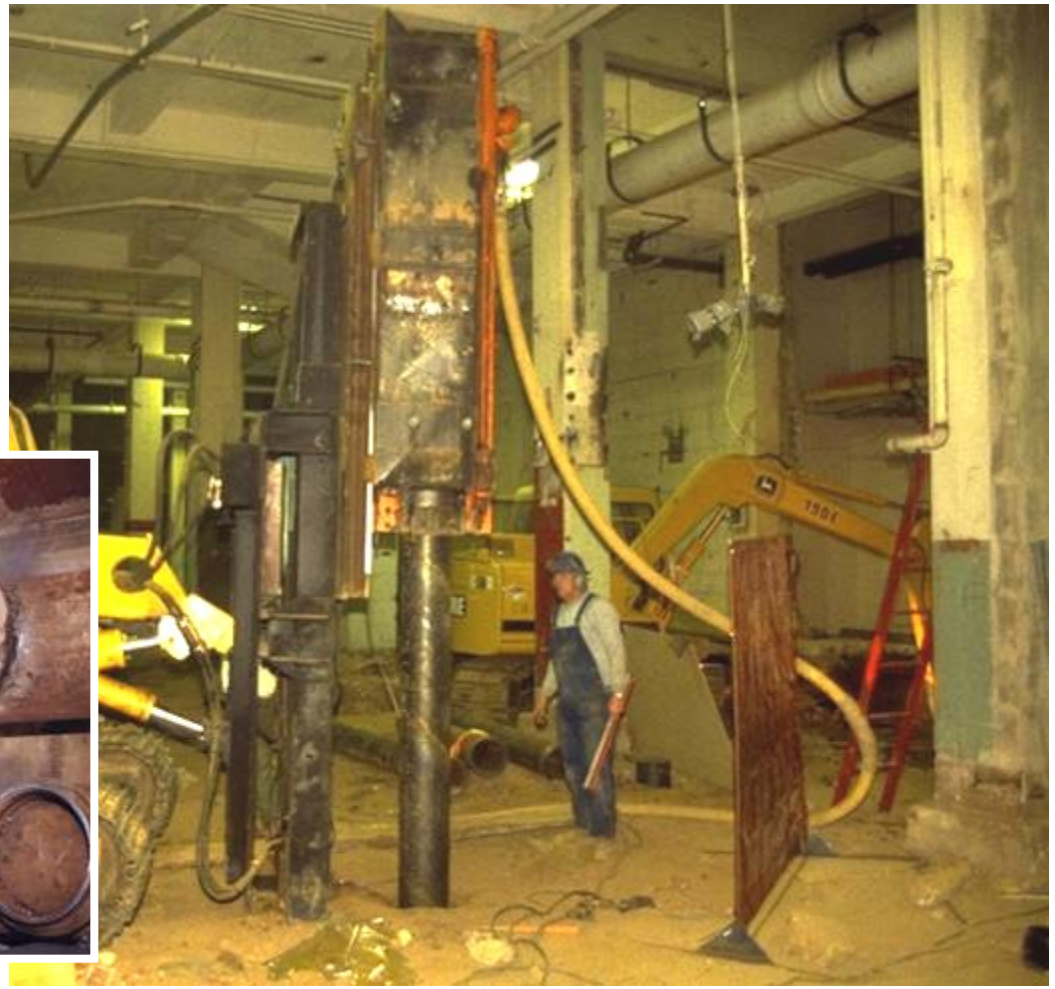
The Pentagon Basement

Pile Driving Challenges:

- Noise

- Low Clearance

- Below Occupied Area



The Pentagon Basement: New Slab

The Pentagon Basement: Raised Flooring

- ***Increases flexibility***
- ***Provides accessibility***
- ***Minimizes disruption to tenants after occupancy***

The Renovated Pentagon:
The Mezzanine - A New Level

The Renovated Pentagon:
Modern Conference Rooms and Work Space

The Renovated Pentagon:
Modern Work Space

The Renovated Pentagon: Improved Lighting and Aesthetics

OLD

NEW

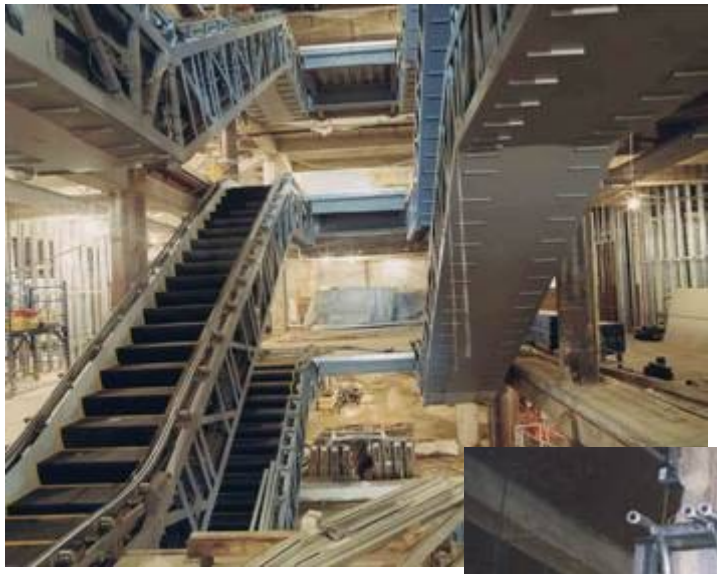
Corridor 8, Basement Segment One

The Renovated Pentagon: Wedge 1

- ***5,000 personnel relocated***
- ***1,000,000 sq. feet***
- ***1,500 windows replaced (382 historic, blast-resistant)***
- ***83 million lbs. debris***
- ***2,000 tons asbestos***

The Renovated Pentagon: Wedge 1 - “Down to the bare bones”

The Renovated Pentagon: Wedge 1



- ***All new systems***
- ***Improved air flow and dispersion***
- ***Increased reliability, redundancy and security***
- ***Improved vertical mobility***

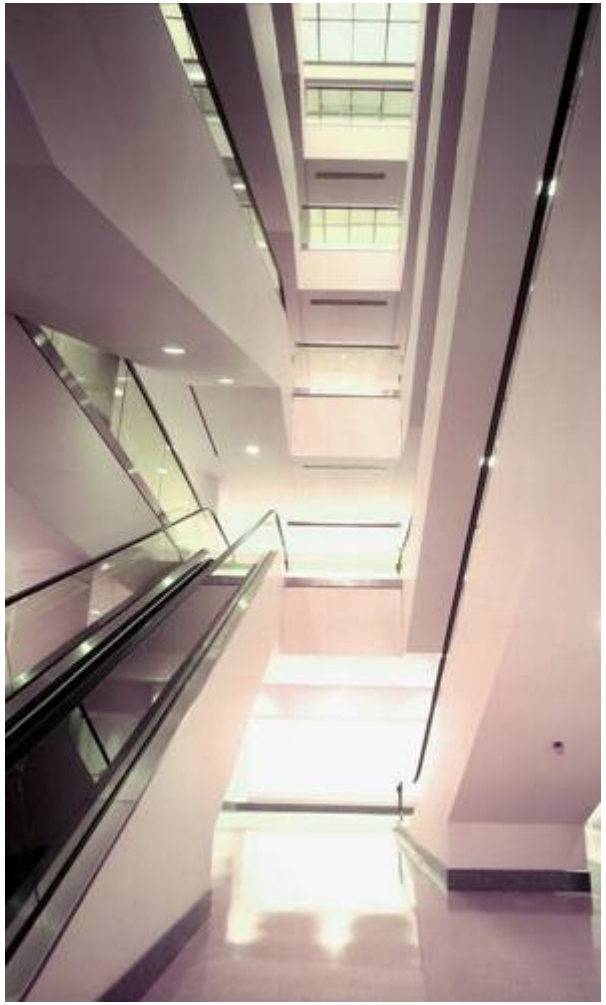
The Renovated Pentagon: Wedge 1

The Renovated Pentagon: Wedge 1

Safe, modern, flexible office environment

The Renovated Pentagon: Wedge 1-5

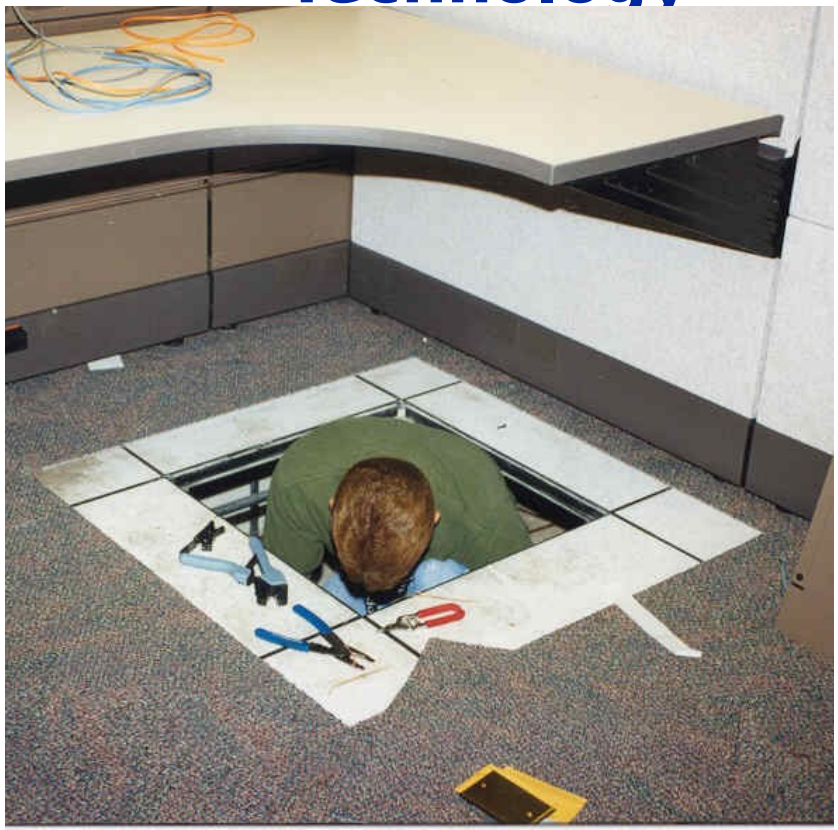
- ***Improved vertical mobility***
- ***Modern corridors***
- ***Safe, flexible working environment***
- ***Code compliance***
- ***Energy efficient***



Wedge 1: Ready for Move-In

- Modern systems furniture
- Increased flexibility
- Improved air flow and lighting
- Improvements to vertical

The Renovated Pentagon: Accommodating Changes in Technology



- ***Faster installation with fewer personnel***
- ***Greater convenience for users***
- ***Greater flexibility for future change***

The Renovated Pentagon:
Coordination with the Disability Community

- ***Goal is to excee minimum ADA thresholds***

South Terrace Pedestrian Bridges

- 3,000 vehicles
- 7,000 - 10,000 pedestrians
- Handicap parking
- One-way traffic
- Police officers needed to regulate traffic flow
- Traffic jams during rush hour

South Terrace Pedestrian Bridge

South Terrace Pedestrian Bridges

- **Safe access without pedestrian/vehicle conflicts**

The Renovated Pentagon: Wedge 1-5
Improvements to Physical Security

The Renovated Pentagon: Wedge 1-5

- ***Blast Resistance***

The Renovated Pentagon: Wedge 1-5

- ***Improvements to Physical Security***

- ***Historical Features Preserved***

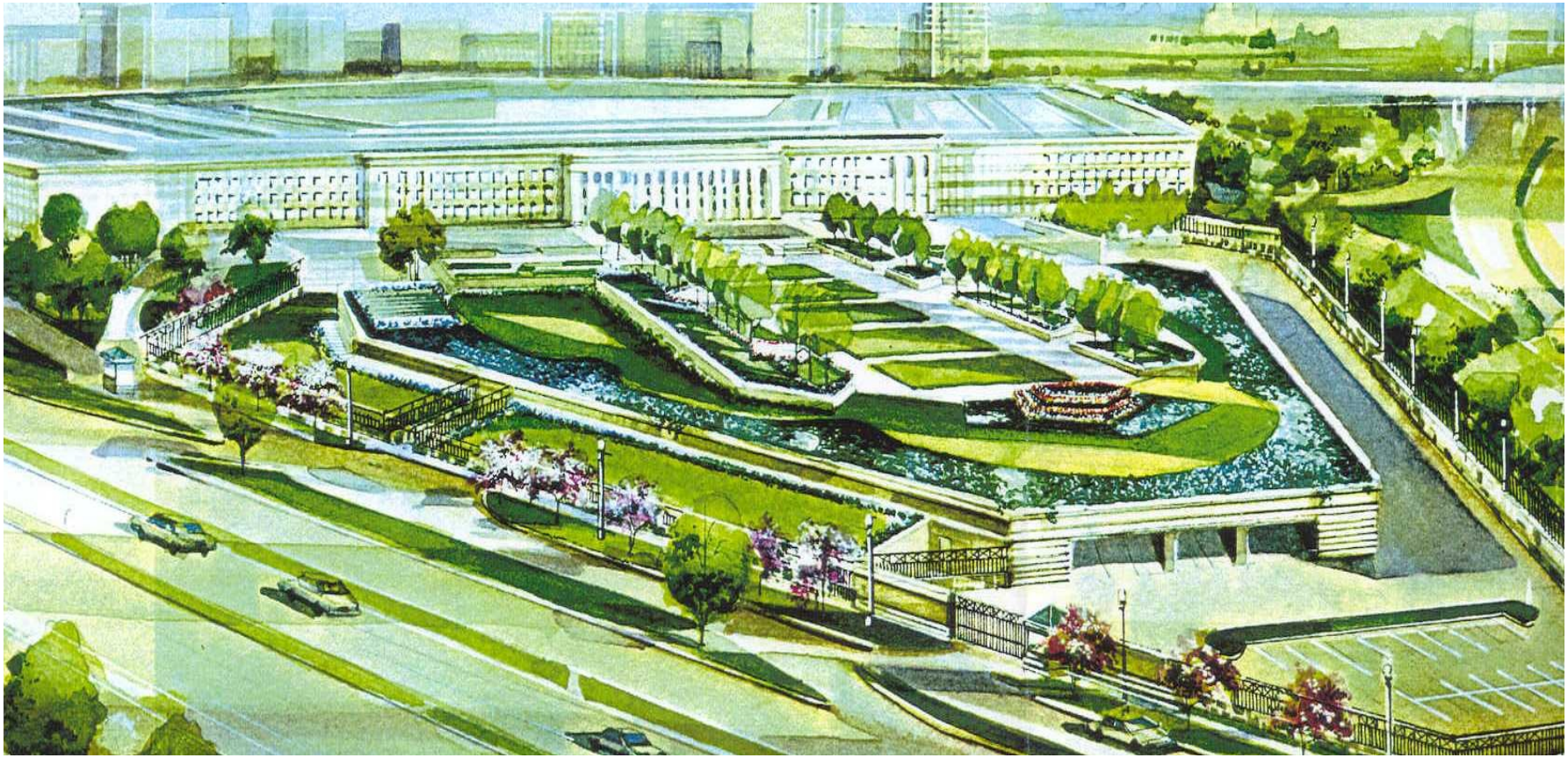
The Renovated Pentagon: Wedge 1-5

- ***Blast Resistance***

The Renovated Pentagon: Physical Security

The Problem: Vehicular traffic adjacent to occupied areas

The Solution: A Remote Delivery Facility

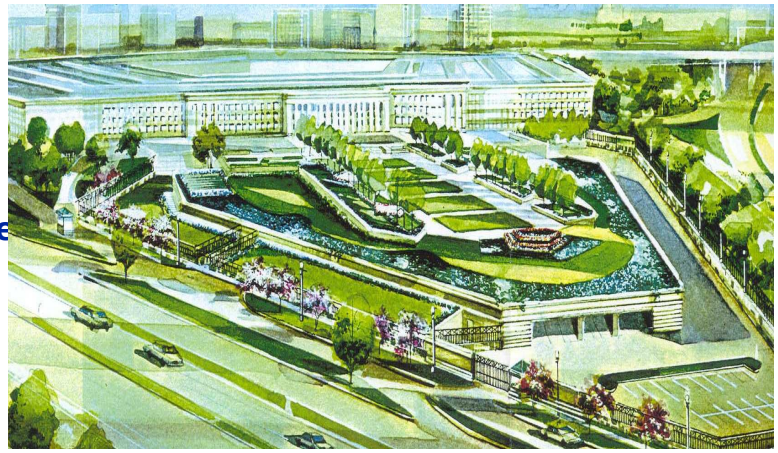


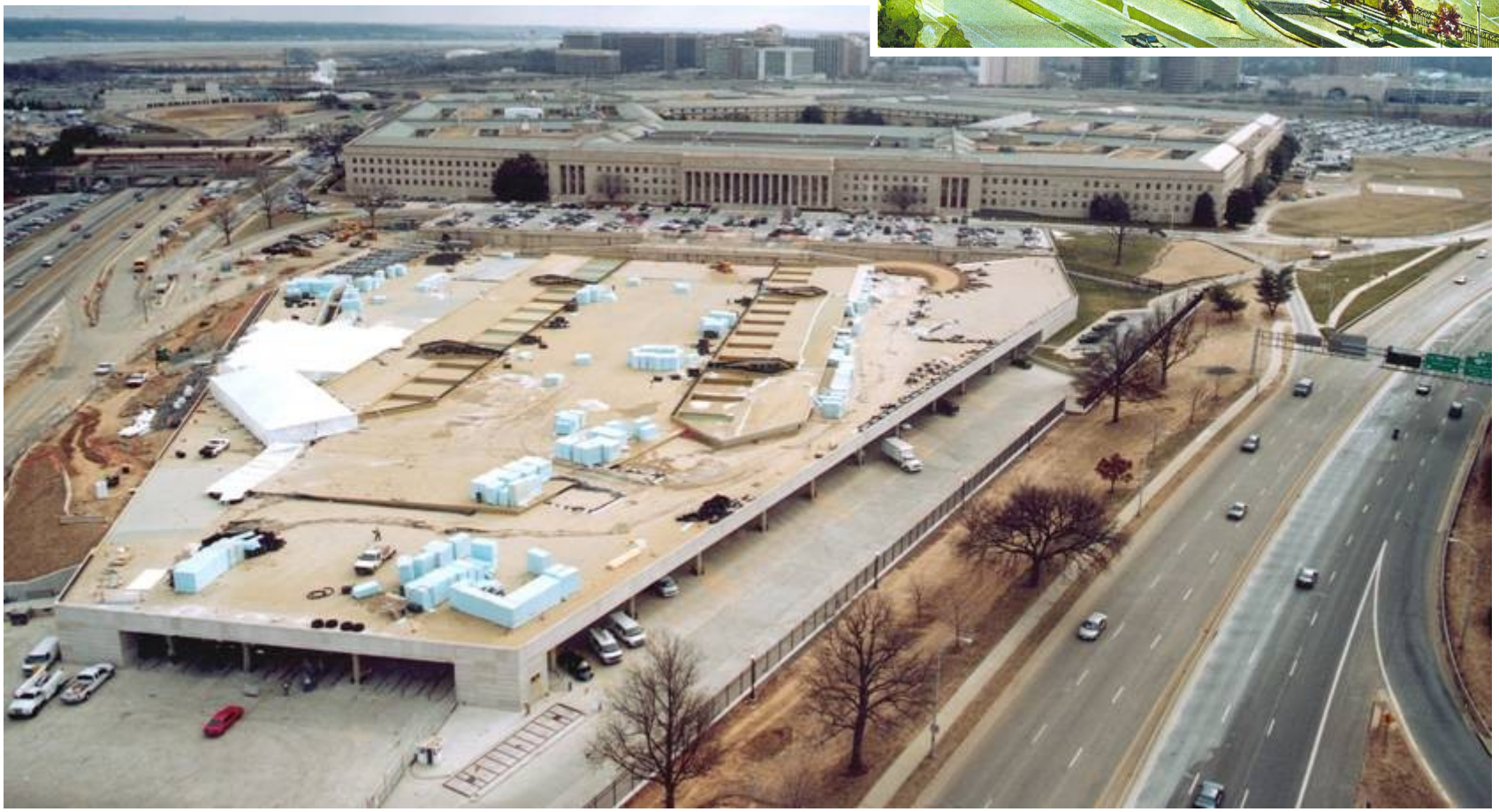
The Remote Delivery Facility

Groundbreaking began May 1999

The Remote Delivery Facility

- Secure, consolidated screening facility apart from Pe
- 250 vehicles daily
- 250,000 square feet
- First design-build contract for PENREN





The Remote Delivery Facility

Loading docks open Aug 00 precisely on schedule, under budget

The Remote Delivery Facility

- Canine inspections

- All materials screened

- State-of-the-art detection technology

The Renovated Pentagon
Physical Security

The Problem:
Pentagon Metro buses pass close to building façade and escalators penetrate building perimeter

The Renovated Pentagon: Improvements to Physical Security

The Solution: Relocate Metro Bus Loop Farther from Pentagon Facade

Pentagon Metro Entrance Facility

Coordination with customers and stakeholders key to success

Pentagon Metro Entrance Facility

Construction begin April 2001 on bus facility relocation

“Greening of the Pentagon”

Initiatives

"Greening of the Pentagon"

Initiatives

- ***Original Heating & Refrigeration Plant demolished***
  - ***Coal-fired until mid-1980s***
  - ***Completely obsolete***
  - ***Boiler, chillers leased at total cost of $200K/month***

"Greening of the Pentagon"
Initiatives

- ***State-of-the-art Heating & Refrigeration Plant (cont'd)***

- ***Computer-controlled***
- ***Fuel oil/natural gas***
- ***Improved reliability and redundancy***

“Greening of the Pentagon” *Initiatives*

- ***State-of-the-art Heating & Refrigeration Plant (cont’d)***

- ***30 % more efficient***
- ***Pentagon architectural features replicated***

“Greening of the Pentagon” *Initiatives*

- ***New utility distribution system***

- ***Increased efficiency***

- ***Accessible, easier to maintain***

- ***Color-coded for prompt identification of conduits***

- ***Configured to come “on line” one wedge at a time***

- ***Modern valve system***

“Greening of the Pentagon”

Initiatives

- *Removal of all hazardous materia*

- *Removal of 25 million pounds of asbestos*

- *Removal of lead paint, mercury, PCBs*

- *Contamina*
  cleaned

"Greening of the Pentagon

Initiatives

- *70% of debris recycled*

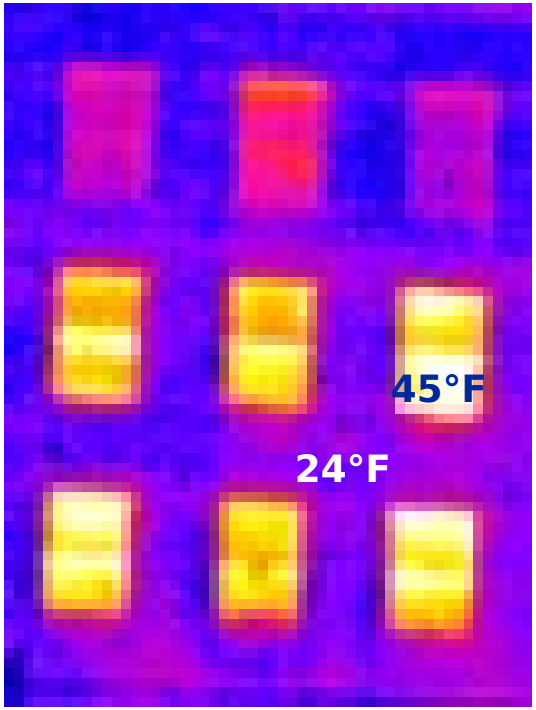
- *Steel*
- *Copper wire*
- *Aluminum*
- *Glass*
- *Concrete*

“Greening of the Pentagon”

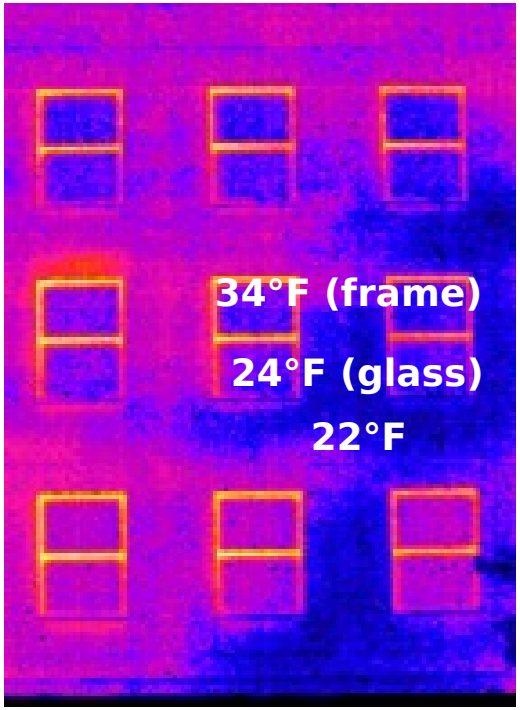
Initiatives

- ***Tighter thermal envelope: windows, insula***

Improvements to Energy Efficiency



OLD WINDOWS



NEW WINDOWS

As you can see, the new double pane energy efficient windows conduct much less heat than the old single pane windows. Only the frames on the new windows are really conducting any heat.

“Greening of the Pentagon”

Initiatives

- ***Open bay environment improves energy efficiency: air flow, lighting***
- ***Use of environmentally safe materials***
- ***Greater flexibility for future changes***

"Greening of the Pentagon"

Summary of Initiatives

- *New Heating & Refrigeration Plant and utility distribution system*
- *State-of-the-art climate control system, tighter thermal building envelope*
- *Open bay environment improves energy efficiency: air flow, lighting*
- *Improvements to pedestrian/vehicular traffic*
- *Greater flexibility for future changes*
- *Investments in new technology and alternativ sources of energy*

Media Attention

- CBS 60 Minutes II
- ABC News
- CNN
- Fox News
- Discovery Channel
- The Learning Channel
- The History Channel

Media Attention

- Washington Post
- USA Today
- Energy & Environmental Management
- Engineering News Record
- Building, Design & Construction
- Building Operating Management
- Government Executive Magazine
- Government Computer News
- Federal Times
- Details
- Metropolis

Political Interest

Acquisition Strategy

Key Objective: Implement Approach that Rewards Behavior We Like

What's Wrong with Construction Today?

- **Contracts reward inappropriate behavior**

  - Low bid awards drive away top performers

  - Bidding process drives bids below reasonable cost

  - Contractors enter process as enemies

- ***Driven to find problems to make profit***
- ***Turmoil, confusion, problems and time delays increase profit***
- ***Contractors play the game according to our rules***

What's Wrong with Construction Today?

- Adversarial relationships have negative impact

- Despite "partnering" la
don't trust
one another

- Lack of trust drives
excessive oversight

- Contract processing costs
exceed value of contract
changes being worked

What's Wrong with Construction Today?

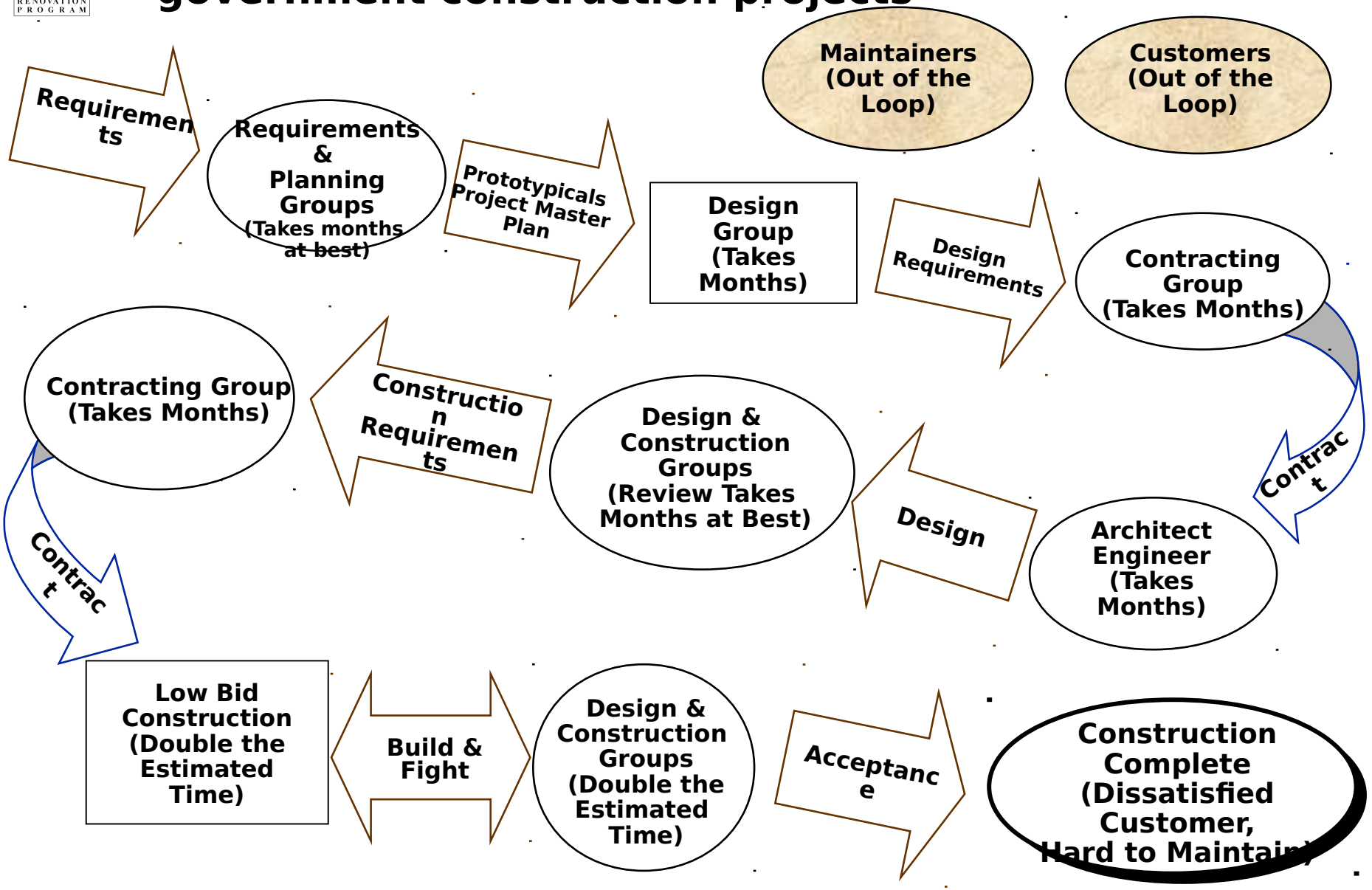
- **The traditional way of doing business in government construction projects**

- Independent action a schedule within each stovepipe organizatio

- Sequential processing

- Multiple goals - multiple managers - CONFLICT!

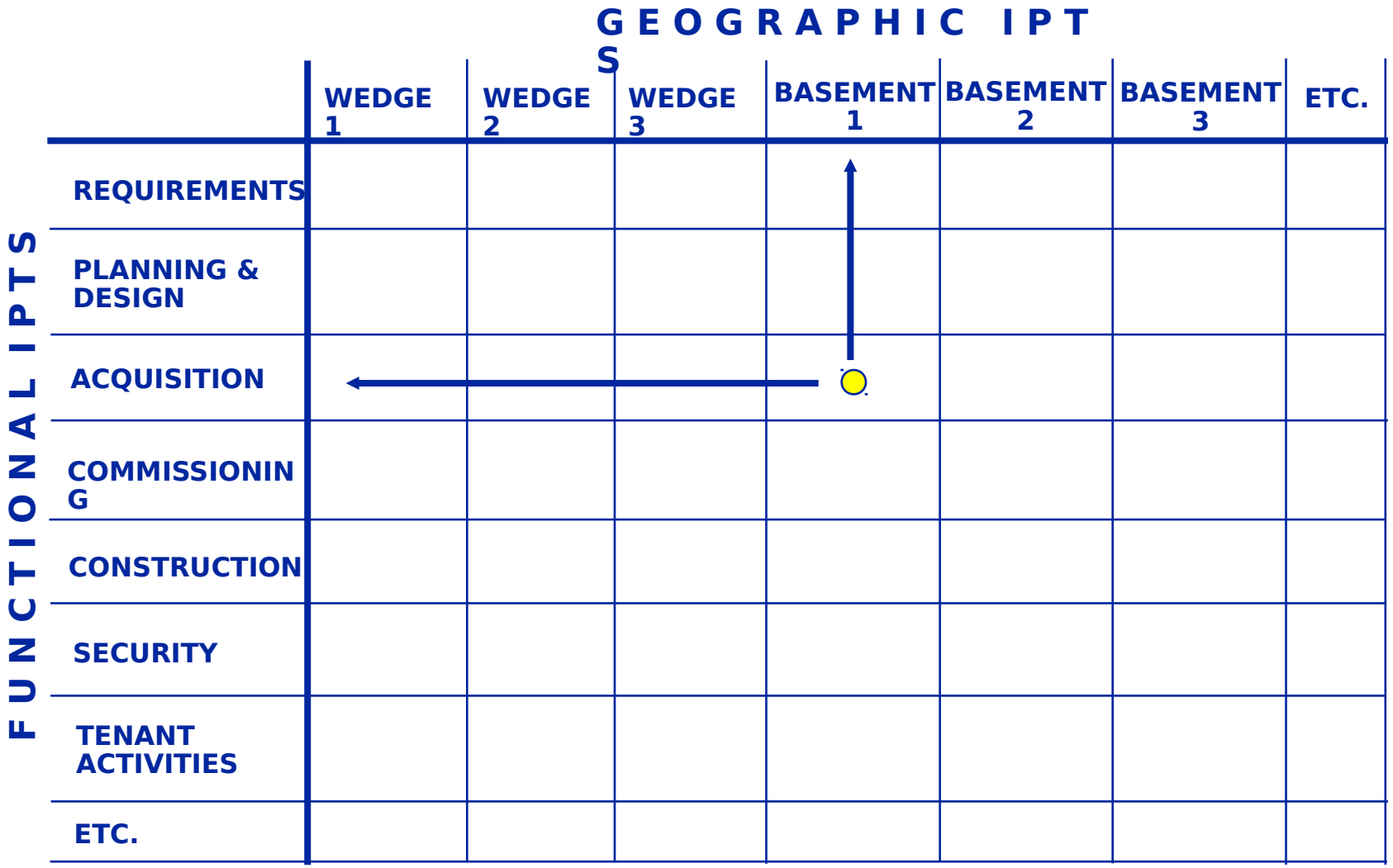
The traditional way of doing business in government construction projects



The New Way of Doing Business in the Pentagon Renovation Construction Projects

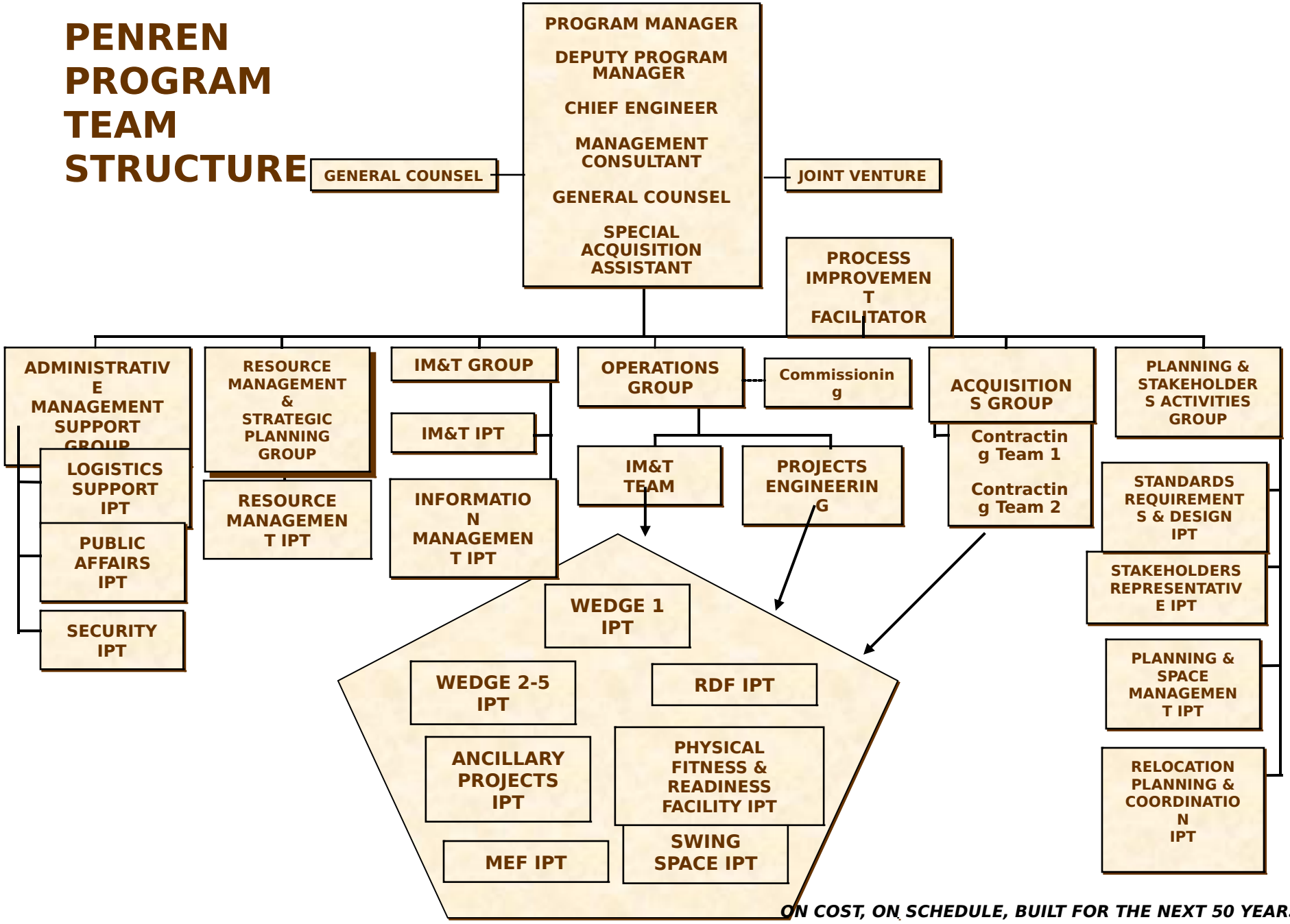
- Unified direction and schedule
- Parallel processing
- Unified goals, unified leader

Making the Process Work: Integrated Product Teams



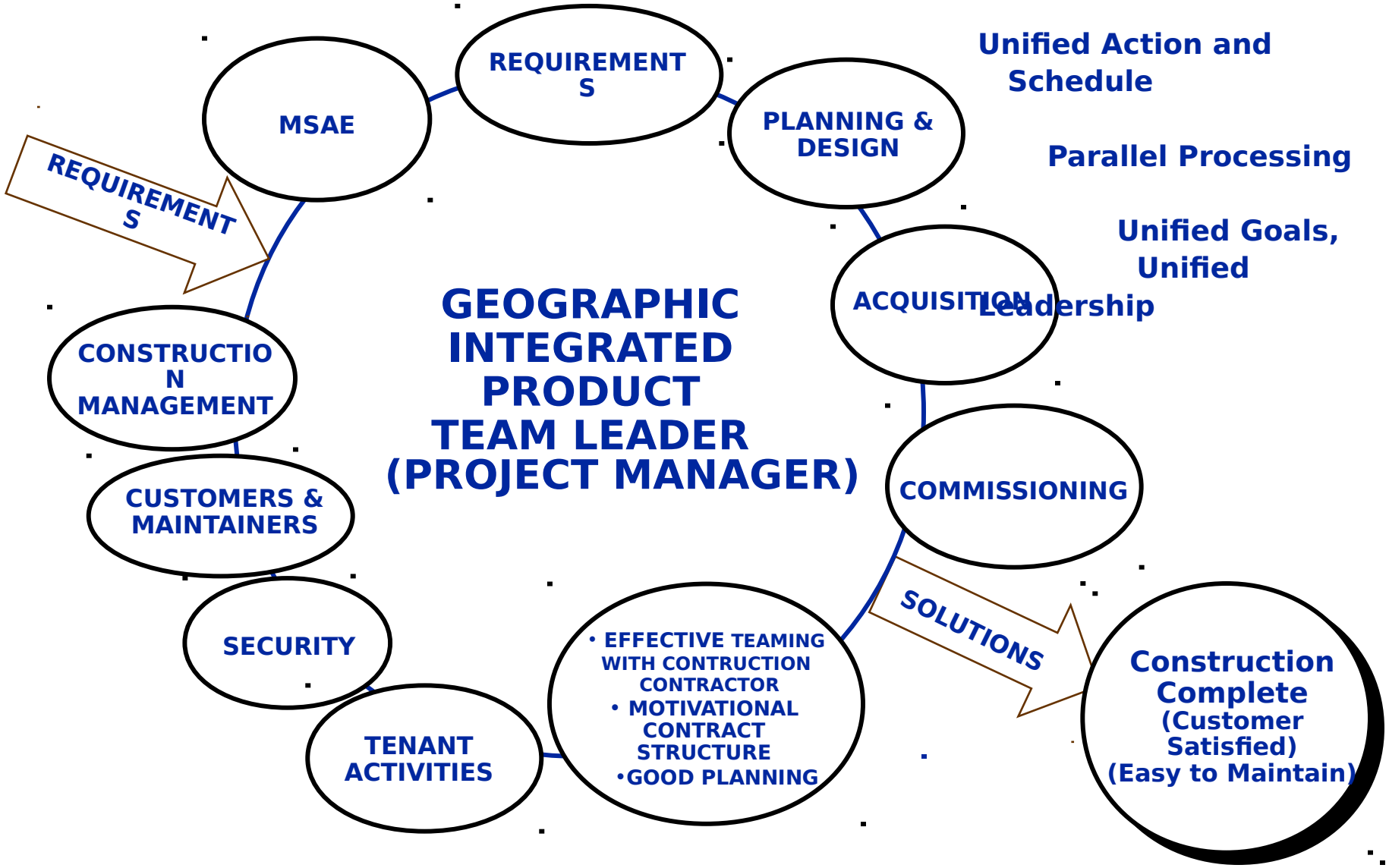
Each person belongs to at least two teams

PENREN PROGRAM TEAM STRUCTURE



ON COST, ON SCHEDULE, BUILT FOR THE NEXT 50 YEARS

The New Way of Doing Business in the Pentagon Renovation Construction Projects



Construction Approaches Used by Pentagon Renovation Program
(cont'd)

- **Effective teaming**
  - **Integrated Product Team**
  - **Functional/Geographic team matrix**
  - **Integration of contractor personnel onto teams**
  - **Integration of customers/maintainers onto teams**

Construction Approaches Used by Renovation Program

- Faster response
- Architect/Engineering support
  - LoE, task order contracts for architect engineers
  - Multiple A/E contractors in place
  - Management support A/E to support program with flexibility
    - Quality assurance/inspection
    - Construction management support to GIPT's
- Furniture
  - IDIQ furniture contracts
    - 5 firms in constant competition
    - Award fees drive subsequent awards
- Construction operations
  - $5K warranted individual on site for instant changes

Construction Approaches Used by Pentagon Renovation Program
(cont'd)

- **Acquisition Planning**

  - **Acquisition strategy meetings**
  - **Single meeting for decisions**
  - **All involved parties present**
  - **Clarify requirements**
  - **Clarify business approach**
  - **Achieve consensus**
  - **All sign**

Government Must Keep Pace with New Way of Doing Business

Problem identification must be followed with prompt review and decision

Must have team in place to mobilize and respond quickly

Procurement process must have flexibility to rapidly activate other contractors

Construction Approaches Used by Pentagon Renovation Program

- **Design-Build contracts for construction**
- **Phased source selection:**
  - **Phase 1 (Initial down-select)**
    - Typically 2-3 teams selected
    - Selection based on team makeup and past performance
    - Fast decision, minimum cost to offero

  - **Phase 2 (Final Selection)**
    - Competition between teams from Phase 1
    - Results in conceptual design
    - Best value…cost, design, team, IMP/IMS
    - Cost as independent variable (give them the budget up front)
    - 100K stipend to offerors

Construction Approaches Used by Pentagon Renovation Program
(cont'd)

- **Strong motivational**
  contract structure
  - **FPIF/AF**
  - **Typically 70/30**
    50/50 share rat
  - **10% AF**
  - **Typically 85% award fee threshold to share incentive opportunity**
  - **Performance specifications**

Wedges 2-5 - 2001

- **Acquisition Approach**: Two-phased source selection IAW FAR 36.3 for design-build

- **Source Selection Approach**: Phase I qualifications screen, Phase II RFP
  - Extensive industry involvement, oral proposals, most probable cost analysis, performance based requi
  - Award value approximately $500M this amount

- **Contract Type**: FPI(F) with award fee
  - 50/50 cost sharing on overruns, 70/30 underruns, 120% ceiling
  - 0% target profit, 10% award fee p

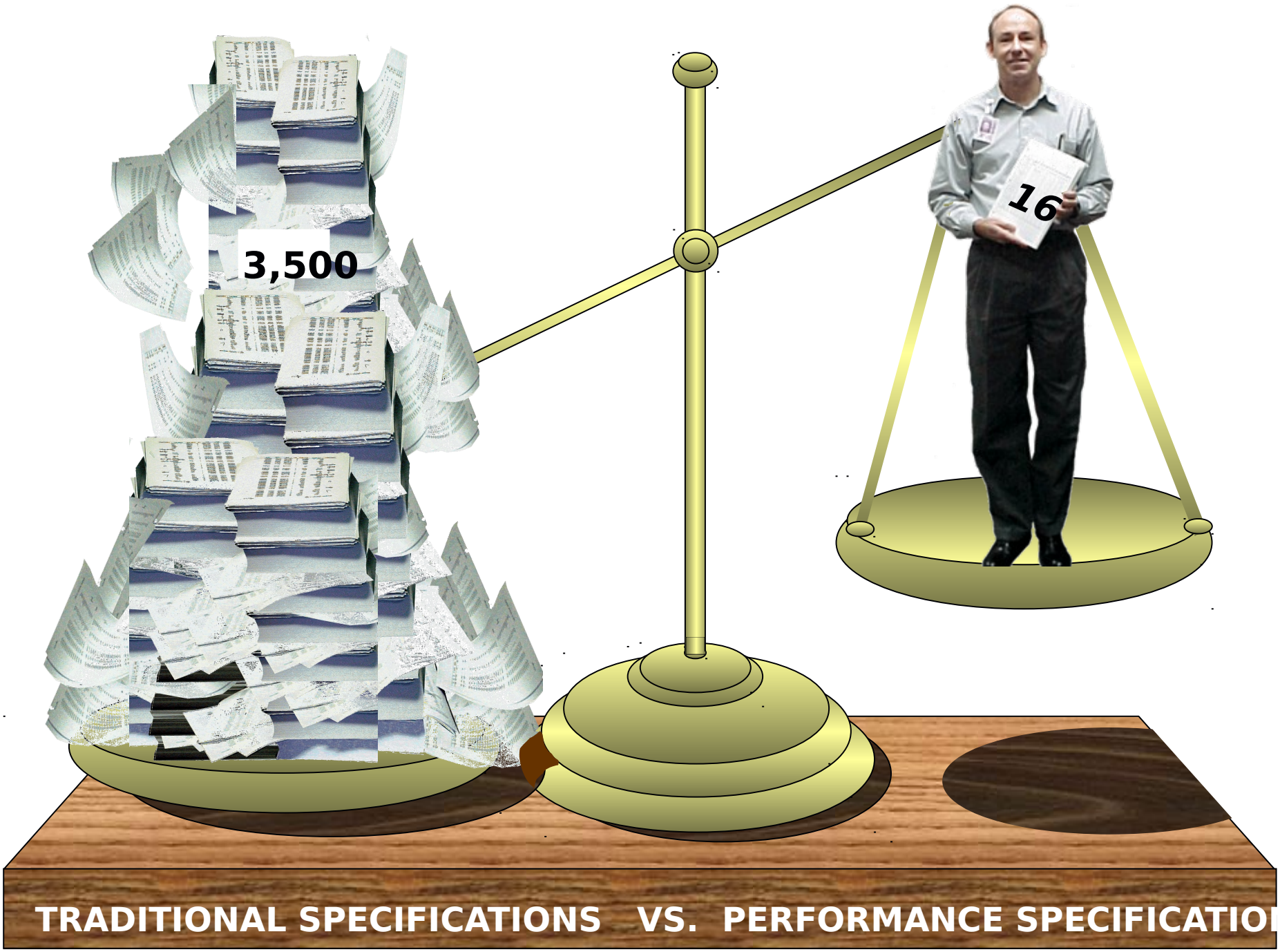
Wedges 2-5 - 2001

- Contract Structure:
  - 10+ years period of performance
  - Every sq. foot of space categorized as a space type
  - 16 pages of performance criteria by space type
  - Market basket mechanism developed for this project to escalate prices over the life of the contract
    - All prices proposed in constant FY2001 $s
  - Earned value management reporting & lean construction techniques
  - Integrated, co-located Govt./Contractor site offices
- Nature of contractual relationship becomes more important than capturing every conceivable possib
- Award expected in July 01

The New Way of Doing Business in the Pentagon Renovation Construction Projects

- **Performanced-Based Requirements**

  - Tell contractor what you want,
  NOT how to get there.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TRADITIONAL SPECIFICATIONS VS. PERFORMANCE SPECIFICATIO

CRITERIA	AREAS	CEILINGS				WALLS				WINDOWS		HVAC		PLUMBING	ELECTRICA
	TYPE	1	2	3	4	1	2	3	4	1	2	1	2	1	1
ACCESSIBILE		X	X	X								X	X	X	X
ACOUSTICS		NCR .55	NRC .65	NRC .55	NRC .55							X	X		
ENERGY EFFICENT										X	X	X	X		X
FLEXIBILITY		X	X	X	X							X	X	X	
GLARE CONTROL															
LIFE CYCLE/ DURABILITY												20	20	X	
LIGHT REFLECTIVITY		LR 0.80	LR 0.83	LR 0.80	LR 0.78										
MAINTAINABILITY		X	X	X	X	X	X	X	X	X		X		X	
REPLACEABLE		X	X	X								X		X	
SECURITY					X			X							
SERVICEABILITY										X		X	X		
SOUND TRANSMISSION						STC 45	STC 45	STC 50	STC 45	STC 45					
STANDARDIZATION / COMPATIBILITY		X	X	X	X						X				

CRITERIA	
TYPE 1	Equipment selection can be any combination of centralized or de-centralized system as long as the equipment/systems meets the mechanical space criteria. Heat Pump systems are not acceptable and roof mounted equipment will require special approval do to the historic status of the facility. Design the HVAC system to provide thermal zones of control. Provide terminal equipment for each zone. Terminal equipment may be variable-air-volume boxes, fan-coil units, or similar devices that are capable of controlling the temperature in their respective zone. Separate perimeter exposure from internal zones. A perimeter zone shall not exceed 55.74 Sq. M, which includes a maximum of 6.1 meters of exterior wall. An interior zone shall not exceed 167.22 Sq. M.. Provide separate zone based on the mechanical criteria spreadsheet.
TYPE 2	Equipment selection shall be based on the specific areas needs. This system will be utilized in the "Special Spaces", primarily operating 24 hours a day capable of meeting specific space requirements as defined on the "Performance Criteria-Mechanical" special space and command areas.
ACCESSIBILITY	Pertains to the ability to locate and perform service on all valving and HVAC equipment/systems that will need attention after installation for operation, maintenance, or emergency needs.
ACOUSTICS	Pertains to the HVAC equipment having an acceptable noise limit based on the space criteria matrix "*Noise Criteria*"
DURABILITY	Pertains to the a… life expectancy … and/or as stated…
ENERGY EFFICIENT	All in…ed HVA… *Standard 90.1-1999*
FLEXIBILITY	Pertains to the ability of the installed HVAC systems to accommodate for future expansion (i.e. increases in capacity, additional zone control needs, pertinent isolation valves, and tenant fit-out changes).
LIFE CYCLE	Pertains to the installed equipment/systems being the most effective over time in reducing costs from purchasing, installing, maintaining, operating, repairing, disposal, and replacing with regards to energy

All installed HVAC equipment/systems shall meet the requirements of Section 6 "ASHRAE/IESNA Standard 90.1-1999"

CRITERIA			OFFICES SUITES			SPECIAL SPACES		
			O-1 Senior Executive Office Suites	O-2 Executive Offices	O-3 General Office Area	SP-1 Laboratory	SP-2 Food Service	SP-4 Automatic Processing (AP
		TYPE	1	1	1	1	1	
MECHANICAL								
Occupancy Schedule	Monday-Friday		0600-1800	0600-1800	0600-1800	0600-1800	0600-2000	
	Saturday		Closed	Closed	Closed	Closed	Closed	
	Sunday		Closed	Closed	Closed	Closed	Closed	
	Holidays		Closed	Closed	Closed	Closed	Closed	
Temp. (°C) (Occupied)	Cooling Summer		24 (+-2)	24 (+-2)	24 (+-2)	24 (+-2)	25 (+-	
	Heating Winter		21 (+-2)	21 (+-2)	21 (+-2)	21 (+-2)	21 (+	
Humidity (%RH)	Summer		50%	50%	50%	50%	50	
	Winter		-	-	-	-		
O.A. Ventilation Rate			20 CFM/Person	20 CFM/Person	20 CFM/Person	20 CFM/Person	15 CFM	
Space Pressure			Positive	Positive	Positive	Negative		
Total Air Flow (ACH-Minimum) During Occupancy			6	6	6	12		
Redundancy			no	no	no	no		
Filtration (% Efficient Pre-Filter / After Filter)			30/80	30/80	30/80	30/80		
Noise Criteria (NC)			35	35	45	35-40		

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